[0051] The nitride semiconductor device of the third embodiment includes a sixth nitride semiconductor layer **19** between a second nitride semiconductor layer **14** and a third nitride semiconductor layer **15**. The sixth nitride semiconductor layer **19** is made of n-type GaN and has a thickness of 5 nm.

[0052] The sixth nitride semiconductor layer **19** functions as an etching stopper during wet etching for forming an opening in the third nitride semiconductor layer **15**. In the second embodiment, the p-type sixth nitride semiconductor layer **18** functions as an etching stopper during the wet etching. On the other hand, in the third embodiment, though the sixth nitride semiconductor layer **19** is of the n-type, which is the same conductivity as the third nitride semiconductor layer **15** to be etched, the sixth nitride semiconductor layer **19** has a band gap smaller than that of the third nitride semiconductor layer **15**, thus enabling stopping of the wet etching.

[0053] In the foregoing embodiments and modified examples, the substrate **11** is a sapphire (0001) substrate. However, the substrate **11** may be made of any material such as SiC, GaN, or Si. The substrate **11** may have any orientation as long as excellent crystallinity is obtained.

[0054] In the case where the first nitride semiconductor layer **13** is made of GaN, the composition of the second nitride semiconductor layer **14** is $Al_{0.15}Ga_{0.85}N$ in order to form excellent channel. The An content thereof may be appropriately changed.

[0055] The third nitride semiconductor layer **15** and the second nitride semiconductor layer **14** may have the same composition or may have different compositions. Instead of AlGaN, either AlN including no Ga or GaN including no Al may be used. In the case of AlN, the layers are preferably epitaxially grown in an amorphous state at a low temperature of approximately 500° C. In general, if an AlN layer is formed on a thick GaN layer having a thickness of several micrometers, a lattice mismatch is large so that cracks easily occur. However, if the AlN layer is grown at a low temperature, no cracks occur to a thickness of about 30 nm. In addition, since the AlN layer which has grown at a low temperature is easily wet etched with an alkaline solution such as a developer, the advantage of easy formation of an opening is obtained.

[0056] The fourth nitride semiconductor layer **16** is preferably made of GaN. In this case, Mg is easily activated. However, the fourth nitride semiconductor layer **16** may have another composition.

[0057] The thickness of the sixth nitride semiconductor layer may be appropriately changed. However, in the case where the sixth nitride semiconductor layer is of the p-type, an excessive thickness of the sixth nitride semiconductor layer would cause leakage current to flow through the sixth nitride semiconductor layer. Thus, the thickness of the sixth nitride semiconductor layer may be in the range where holes are depleted in the region between the gate electrode and the drain electrode and between the gate electrode and the source electrode.

[0058] The gate electrode may be made of other metals such as Ni as long as an excellent ohmic contact is obtained.

[0059] In the foregoing embodiments, GaN and AlGaN are used as nitride semiconductor materials. However, the present invention is not limited to these materials. For example, InGaN and AlInGaN may be used. The thicknesses of the layers may be appropriately changed.

[0060] As described above, a nitride semiconductor device and a method for fabricating the nitride semiconductor device according to the present invention allow a normally-off nitride semiconductor device in which the ON resistance is low and occurrence of current collapse is suppressed to be implemented and, thus, are useful especially as a power transistor for use in a power supply circuit in consumer equipment such as a television set and a method for fabricating the power transistor, for example.

[0061] The description of the embodiments of the present invention is given above for the understanding of the present invention. It will be understood that the invention is not limited to the particular embodiments described herein, but is capable of various modifications, rearrangements and substitutions as will now become apparent to those skilled in the art without departing from the scope of the invention. Therefore, it is intended that the following claims cover all such modifications and changes as fall within the true spirit and scope of the invention.

What is claimed is:

1. A nitride semiconductor device, comprising:

a substrate;

a first nitride semiconductor layer formed on the substrate;

a second nitride semiconductor layer formed on the first nitride semiconductor layer and having a band gap energy larger than that of the first nitride semiconductor layer;

a third nitride semiconductor layer formed on the second nitride semiconductor layer and having an opening;

a p-type fourth nitride semiconductor layer filling the opening; and

a gate electrode formed on the fourth nitride semiconductor layer.

2. The nitride semiconductor device of claim **1**, wherein the third nitride semiconductor layer is of an n-type.

3. The nitride semiconductor device of claim **1**, further including a fifth nitride semiconductor layer formed between the second nitride semiconductor layer and the fourth nitride semiconductor layer.

4. The nitride semiconductor device of claim **3**, wherein a difference in lattice constant between the second nitride semiconductor layer and the fifth nitride semiconductor layer is smaller than that between the second nitride semiconductor layer and the fourth nitride semiconductor layer.

5. The nitride semiconductor device of claim **1**, further including a sixth nitride semiconductor layer formed between the second nitride semiconductor layer and the third nitride semiconductor layer.

6. The nitride semiconductor device of claim **5**, wherein the sixth nitride semiconductor layer is of a p-type.

7. The nitride semiconductor device of claim **6**, wherein a difference in lattice constant between the sixth nitride semiconductor layer and the fourth nitride semiconductor layer is smaller than that between the second nitride semiconductor layer and the fourth nitride semiconductor layer.

8. The nitride semiconductor device of claim **6**, wherein the sixth nitride semiconductor layer has a band gap energy larger than that of the fourth nitride semiconductor layer.

9. The nitride semiconductor device of claim **8**, further including a fifth nitride semiconductor layer formed between the sixth nitride semiconductor layer and the fourth nitride semiconductor layer.

10. The nitride semiconductor device of claim **9**, wherein a difference in lattice constant between the sixth nitride semiconductor layer and the fifth nitride semiconductor layer is